Balancing an Architectural Lighting Design with the Cost of Energy

In theory, any lighting design should enhance an environment, improve visibility and create beauty, without regard to the overall cost of operating the lights. At the same time, it is important to "think green" today. Using equipment that will not pollute the environment is a greater concern with each passing year. And the need to pour less carbon dioxide into the air is a noble desire as well, in my opinion.

No doubt in the future, when LED technology has matured, we will have light sources that are extremely bright, fully dimmable, consume little energy and last for years and years, while remaining non-polluting to the environment. Along with this new generation of LED lights, the cost of each solid-state device will go down enough to be wanted in every type of architectural lighting project.

That day is not here yet. So, as designers, we must balance the budget along side the beauty of a project. This goes beyond the simple mathematics of calculating the correct amount of light for a given space. We must consider the quality of the light as well as its source. A warm, natural light is soothing to the eyes and compliments skin tones and building materials. To achieve that quality today, the light still needs to be an incandescent of some type.

It is true that some florescent lights mimic a warmer or cooler white. But the quality of light goes beyond the apparent Kelvin temperature of a lamp. There is a psychological element that also needs to be addressed in a light. This can be something as simple as choosing a hidden, single point over a dining table in a restaurant as a light source. The dramatic effect this light invokes will differ greatly from that of two florescent tubes over the same table.

But if we are to consider the costs of running the lights while conceiving our designs, we need to think creatively. The cost of electricity varies depending on your location. In the U.S., for example, residential electric rates go from R$ 0.15 to R$ 0.55 per kilowatt hour, with NYC's at R$ 0.33. (A kilowatt hour is the amount charged by your electric company for each 1000 watts consumed per hour.) In Rio de Janeiro, the average residential kilowatt hour charge is R$ 0.32. But in Venezuela the kilowatt hour charges are approximately R$ 0.05. Naturally, the kilowatt charges are higher for business and industry wherever you are.

As designers, we need to make rational choices for our clients. And we must give them options from optimum design to optimal savings on any given project. What follows below are a few ideas to consider.

OUTDOORS

In designing the lights for an outdoor billboard or sign you can use mercury or sodium vapor lamps to achieve a bright, intense sign that will attract attention. But it will also consume a lot of power each night. An alternative would be to use high output, florescent lamps in weather-proof housings as the light source. With this alternative, you will lower the nightly energy consumption but your initial costs will be higher than using the more traditional short arc

lamps. And the florescent choice will give you two other things that will add impact to your project. First, they will provide a smooth light across the entire outdoor sign. And second, the lamps will only need to be changed every 20,000 operating hours which is nearly 40% longer than using mercury vapor.

RESTAURANTS & CLUBS

In a restaurant or night club design you want to be able to control the “ambiance” of a room depending on the time of day or the event. Strictly speaking in a club you want to draw people's attention to the stage when there is entertainment but never darken the tables so much that food and drink cannot be seen. While in a restaurant you may wish to create intimacy but not have it so dark as to make it hard to read a menu.

For me, a night club is theatre with food service. This means that some areas require brighter lighting than others. Where food and drinks are prepared, more light is needed. And where it is consumed, the levels should be lower. You also need to make certain that light from the kitchen does not enter into other areas and ruin the mood you are trying to establish.

If there is a dance floor … well, do whatever you like, depending on the type of music being played. Just don't limit your design to one or two repetitive lighting looks. People want to be motivated by the music *and* the lighting when they're on the dance floor. And if there is a live band, your lighting needs to be flexible enough to provide accent lighting on a single musician or the entire group. And don't forget the special effects like haze, strobes, LED panels and blacklight!

Restaurants and night clubs can also use low-voltage lights to get the most light for the money. But if you've got a dance floor you are going to increase the usage of electricity because of the various lighting moods that need to be created. Here is a place where theatrical and moving lights are the perfect tools to use. But to be really effective these lights MUST be programmed. You can't simply set them to move randomly. So you will need to purchase a lighting console that can record different cues. More importantly, you will need to hire a programmer to create and record the various moves you want to use, if you can't do that yourself.

Moving lights take time to program. They need regular maintenance, so you must have time during the day for possible repairs and lamp replacements. And they consume energy all through the night even when the dance floor is not being used. But keep in mind that restaurants and night clubs have refrigerators, freezers and ice making machines that run 24 hours a day. These businesses are spending money even before their doors open each day. It is difficult for clubs and restaurants to be energy efficient.

RESIDENTIAL

When it comes to residential lighting, “control” is the key to making an environment

comfortable and flexible. In a kitchen, it may be all right to have one or two florescent lamps on the ceiling to achieve a brightly lit room. But I would consider using additional lights over the counters or under shelving if they exist. More light is better than less in a kitchen. And don't forget to light the kitchen table area as well. This should be on a separate circuit from the rest of the room lighting.

In the master bedroom you should have multiple lights that can be controlled either individually or in groups. This can be done with wall switches or using higher technology like a hand-held remote control device. Bedrooms need general room lighting with additional lights near the bed for reading. Other lighting options include track lighting, light on or behind shelving and wall washes which add to the intimacy of the room.

In a home office, your desk needs to have a good, clean light source. I use a 9 watt LED desk light that completely covers my working area. When I use it I do not even need the overhead room light. The LED light is focused on the desk but does not reflect into my computer screen.

But when I'm entertaining friends, I prefer to light the room using indirect lighting. My favorite method is to bounce light off the ceiling using a strong PAR lamp. When placed in a corner and properly hidden (maybe by a plant or vase), all you see is the elliptical pattern of light on the ceiling. Having the light on the floor makes it easy to replace the lamp when needed but more importantly it's easier to change the color of the light by placing a gel atop the light. Adjacent to the sofa are a table lamp for reading and a floor lamp for additional room light. These can be used separately or in conjunction with the bounce lights.

If you are a technical geek like me, you can control all these lights remotely. There are many companies on the internet that offer computer controlled systems using small dimmers that plug into standard receptacles. Less expensive models come packaged with three dimmers and a small hand-held remote control but cannot connect to your PC.

A bathroom needs lighting with a warm natural feel, especially surrounding the mirrors. Faces need to be lit but the lights should not be “in your face”. Once again, indirect lighting can be used along with lights that are hidden behind lightly frosted panels. This will mask the source of the light with subtle diffusion. Another technical improvement you can make in a bathroom is using a touch plate dimmer. This is a simple programmed electronic dimmer that dims on or off with a single touch. No more being blinded by your bathroom light in the middle of the night!

DON'T RE-INVENT … RETRO-FIT

Many homes and business here in Brazil use the diachroica lamp to light walls, hallways and counter areas. These are wonderful lights that give off plenty of lumens and heat while they consume lots of power. To reduce the amount of energy used, you should look into LED retrofit replacements. I know. They are expensive right now. But they will last up to 25,000

hours as of today. That's almost 3 years of continuous light! No one leaves lights on 24 hours a day. So even at 12 hours a day these lights should last 6 years before you need to replace them. By then the prices will have decreased significantly and the brightness will have increased. Who wouldn't trade a 25 watt lamp for an equivalent light source consuming only 9 watts? There are literally dozens of retro-fit LED lamps available today to replace many smaller wattage incandescents. And while these units are also not cheap to purchase, you will not have to replace them for many years. The cost saving in fewer watts used per month and practically no burn outs for many years makes these lights a good investment right now.

IN CONCLUSION

These are just a few ideas to think about as you begin creating your next lighting project. Remember to keep up with all the new developments in lighting and control systems. Place your email address on the mailing list of the bigger companies like Sylvania, GE and Osram for continuous updates in all areas of illumination. Regularly surf the internet and look for new technologies. There's a tremendous amount of data available out there.

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